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The Formation of Benzyl Nitrile, Benzyl Isothiocyanate and Benzyl Thiocyanate in the Crushed Seeds of *Lepidium sativum*

In a previous communication[1] results were reported which showed that benzyl isothiocyanate (BITC) is formed enzymically from the benzyl thioglucoside (glucotropaeolin) present in the crushed seeds of cress (*Lepidium sativum*). Benzyl thiocyanate (BTC) is then formed from BITC by enzymic isomerisation. These enzymic reactions are extremely rapid. The formation of BITC takes place even close to 0°C at an almost explosive rate. The formation of BTC is so much slower that it can be shown to be formed from BITC.

On continued investigations, it was found that benzyl nitrile (BCN) is formed in the crushed seeds of *Lepidium sativum* as the third reaction product. If the reaction is performed so that cold water (+ 1°C) is poured onto the extremely finely ground seeds (seed powder), cooled to 0°C, the three reaction products mentioned are formed at the rates shown in Fig. 1.

It appears from the figure that

1. BITC and BCN are formed from the benzyl thioglucoside simultaneously and at much the same rate.
2. BTC is formed from BITC, as earlier found.

The formation of BCN is enzymic. Only BITC is formed, and no BCN or BTC, in the crushed seeds of *Tropaeolum majus* which contain the same thioglucoside, glucotropaeolin, as *Lepidium*. The formation of BCN is accordingly not caused by »myrosinase». Since a splitting of the linkage of the S-atom present in the glucoside is a presupposition for the formation of BCN, this splitting is caused by a factor present in *Lepidium* seeds. BCN is formed from the thioglucoside without a Lossen rearrangement, and hence the largest part of glucotropaeolin is split in *Lepidium* seeds without this rearrangement which is characteristic of the formation of isothiocyanate. The following scheme illustrates the formation of BCN, BITC, and BTC (Fig. 2).

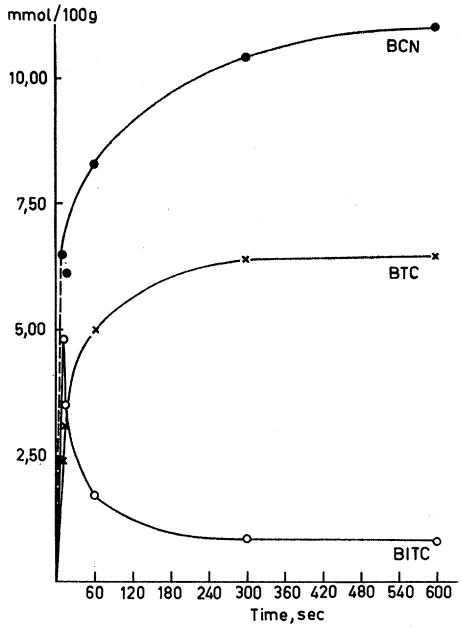

Fig. 1. Formation of benzyl nitrile (BCN), benzyl isothiocyanate (BITC), and benzyl thiocyanate (BTC) in finely ground *Lepidium sativum* seeds. Reaction temperature at about + 1°C.

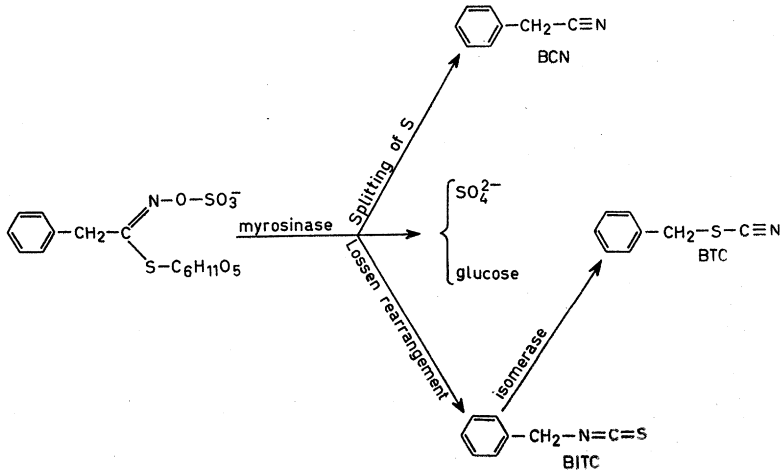

Fig. 2.

A detailed report will be published in *Acta Chemica Scandinavica*.

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Reference

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